GALILEO ORBITER ULTRAVIOLET OBSERVATIONS OF JUPITER AURORA

In 1996 during the first four orbits of the satellite tour the Galileo Ultraviolet Spectrometer (UVS) (1130-4320 Å) and Extreme Ultraviolet Spectrometer (EUVS) (540-1280 Å) performed near-simultaneous observations of the Jupiter aurora in both the north and south polar regions. These observations are modeled to provide the absolute surface brightness of the aurora from the H_2 Rydberg Systems (B, B', B", C, D, D' $\rightarrow$ X band systems) and the H_2 (a-b) continuum. The spectral distribution and brightness of the EUV aurora is sensitive to H_2 abundance, H_2 temperature and CH_4 abundance. Analysis of the emission spectrum indicated that the EUV aurora (800-1200 Å) was produced over a range of altitudes corresponding to slant column abundances of H_2 from 10^{16} to 10^{20} cm^{-2} or greater. The UVS spectrum of the far ultraviolet (FUV) from 1130-1700 Å is optically thin in H_2, but highly sensitive to the CH_4 column abundance and to the secondary electron energy distribution. The slant column abundance of CH_4 absorbers found from a model of the FUV spectrum varied in the range 0 - 10 x 10^{16} cm^{-2}, indicating the presence of both high altitude aurora, at or above the homopause and deep aurora. The surface brightness of the aurora from the H_2 Rydberg Systems was 100 to 600 kR and of H Lyman-α was 60 to 130 kR for a 2000 km wide oval. The total power input to the atmosphere from particle deposition was estimated to be $\sim$ 1 x 10^{14} watts. The EUVS integrated spectra of the H_2 Rydberg Systems and H Lyman-α are also presented as images that reveal structure from both the dayglow and aurora. The H_2 (a-b) continuum in the MUV (1620 - 3231 Å) is excited by electron exchange reactions with H_2. The ratio of the FUV/MUV is diagnostic of the secondary electron distribution.